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Process Performance Evaluation for Non-normal Distributions

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Abstract

Process capability indices (PCIs) are used to provide numerical measures on process performance and determine whether a production process is capable of producing products within a desired tolerance. Even cases of process data with normally distributed are very common in practical situations, cases of process data with non-normal distributions are also occurred in the manufacturing industry. Unfortunately, when the distribution of a process characteristic is non-normal, the conventional PCIs may be misrepresent the actual product quality and may cause practitioners to carry out incorrect decisions. A modified capability index has been developed by using a heuristic weighted standard deviation (WSD) method to adjust the value of PCIs according to the degree of skewness, considering separately the standard deviations above and below the process mean. In this paper, the nonparametric bootstrap approach is applied to establish the confidence interval of the modified capability index for process performance evaulation and capability testing purposes. Finally, an example is presented to demonstrate the applicability of the proposed method.

Keywords
Bootstrap approach, confidence interval, process capability analysis, quality assurance, skewed populations.

Biography

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